CLAIMS

I claim:

1. A reel-up comprising:

a reel-up frame;

a reeling cylinder mounted on the reel-up frame;

two carriages mounted for motion on the reel-up frame;

a reel spool mounted between the two carriages, each carriage having an arm which is positioned in a downstream direction from the reel spool, the two carriages are movable to urge the arm on each of the two carriages toward the reel spool, and to urge the reel spool toward the reeling cylinder to form a nip therewith;

a first member, mounted to each of the two carriages, the first member having flexible portions of a selected spring constant, wherein the first members are positioned on the two carriages to engage the reel spool, each first member movable toward the arm of each carriage, and each first member being limited in its motion toward the arm of each carriage by a first stop mounted to the at least one arm; and

a load cell, having a maximum load limit, mounted on each of the at least one arm so that during motion of the first member toward the at least one arm, the flexible portion of each of the first members engages the load cell, and wherein the first member, the load cell, and the stop are arranged so that when the first member is engaged with the stop, the selected spring constant of the flexible portion is such that the loading applied to the load cell is less than the maximum load limit of the load cell.

2. The reel-up of claim 1 wherein the first member is pivotally mounted by a pivot base to a pivot bearing on the carriage, and a flexible cantilever beam extends from the pivot base and is engageable with the stop, and wherein the load cell is positioned downstream of the flexible member between the stop and the pivot.

3. The reel-up of claim 2 further comprising a second stop mounted to the carriage upstream of the first member to prevent the first member from pivoting in the upstream direction.

4. The reel-up of claim 1 further comprising a pair of parallel rails, and wherein said at least two carriages are mounted for motion on said pair of parallel rails.

5. A method of measuring the load applied to a nip between a forming paper reel and a reeling cylinder, comprising the steps of:

forming a paper reel on a reel spool;

supporting the reel spool between a pair of spaced apart carriages;

moving the paper reel mounted on the pair of spaced apart carriages into engagement with the reel cylinder and forming a nip between the reel cylinder and the forming paper reel;

moving the pair of spaced apart carriages and the paper reel mounted thereon into engagement with the reeling cylinder to form a nip between the reeling cylinder and the forming paper reel;

pressing on the reel spool by engaging the reel spool with first members mounted on the each carriage, each first member having flexible portions having a selected spring constant, and each first member being mounted to one of said two carriages for motion toward a stop, the reel spool being thereby urged against the reel cylinder to define a nip;

measuring the force applied to the defined nip with a load cell mounted on each carriage, the load cells having a selected maximum capability, and each load cell being mounted so as to be engaged by one of the first members, wherein a maximum load with which the pivotal first member can engage the load cells is controlled by the selected spring constant of the flexible portion of the first members and the stop mounted on the carriages, so that when the stop is engaged by the first member the flexible portions are engaging the load cell at the load which is less than the selected maximum capability of the load cell.

6. The method of claim 5 wherein the spring constant is selected to control the maximum load on the load cell to be approximately the maximum range of the load cell.

7. The method of claim 5 wherein the first members are pivotally mounted to the carriage, and pivot toward the stop as the carriages presses against the reel spool, the flexible portion of the first member being formed by a flexible beam which extends between a pivot mount and the stop, the flexible beam having the selected spring constant, and engaging the load cell positioned on the carriage between the pivot mount and the stop.

8. A method of measuring the forces in a reel-up comprising the steps of:

urging a loading member mounted to a reel-up frame against a reel spool, with a first selected force to urge the reel spool towards a reeling cylinder, the loading member being mechanically arranged to apply to a load cell mounted on the reel-up frame a force proportional to the first selected force applied to the reel spool;

selecting the loading member so that a portion of the loading member has a selected spring constant, so that the portion of the selected member deflects under load, so that as the loading member engages and loads the reel spool urging it towards the reeling cylinder, the loading member portion having the selected spring constant deforms elastically until it engages a stop mounted on the reel-up frame, the selected spring constant being selected to control the maximum load on the load cell when the loading member is engaged with the stop.

9. The method of claim 7 wherein the spring constant is selected to control the maximum load on the load cell to be approximately the maximum range of the load cell.